

WHAT IS CLAIMED IS:

1. A semiconductor device comprising:
 - an internal device including a first well region and a first semiconductor element formed in and/or on the first well; and
 - a protection device including a second well region and a second semiconductor element formed in and/or on the second well region, the second well region having a lower impurity concentration than the first well region, the protection device protecting the first semiconductor element.
2. The device according to claim 1, wherein:
 - the second semiconductor element includes a current path, the current path having one end connected to an external connection terminal and another end connected to a ground potential;
 - the first semiconductor element having an input/output terminal connected to the external connection terminal; and
 - the second semiconductor element guides, to the ground potential via the current path, a current flowing to the second semiconductor element from the external connection terminal, to prevent the first semiconductor element from being destroyed by the current.
3. The device according to claim 2, wherein a voltage occurring between the ends of the current path

when the current flows into the second semiconductor element is less than a breakdown voltage of the first semiconductor element.

4. The device according to claim 2, wherein:

5 the protection device further includes a trigger circuit which starts an operation of the second semiconductor element;

10 the second semiconductor element is a thyristor or a bipolar transistor, the thyristor or the bipolar transistor having a control terminal connected to the trigger circuit; and

15 the trigger circuit supplies the control terminal of the second semiconductor element with an instruction to start the operation of the second semiconductor element, when the current flows from the external connection terminal to increase a potential at the input/output terminal, and when the potential at the input/output terminal is less than a breakdown voltage of the first semiconductor element.

20 5. The device according to claim 2, wherein:

the second semiconductor element is a MOS transistor; and

25 a gate potential of the MOS transistor changes in synchrony with a voltage at the one end of the current path.

6. The device according to claim 1, wherein an entire portion of the second well region in a depth

direction has a lower impurity concentration than an entire portion of the first well region in the depth direction.

7. A semiconductor device comprising:

5 an internal device including a first well region and a first semiconductor element formed in and/or on the first well; and

10 a protection device including a second well region and a second semiconductor element formed in and/or on the second well region, the second well region having a greater depth than the first well region, the protection device protecting the first semiconductor element.

8. The device according to claim 7, wherein:

15 the second semiconductor element includes a current path, the current path having one end connected to an external connection terminal and another end connected to a ground potential;

20 the first semiconductor element having an input/output terminal connected to the external connection terminal; and

25 the second semiconductor element guides, to the ground potential via the current path, a current flowing to the second semiconductor element from the external connection terminal, to prevent the first semiconductor element from being destroyed by the current.

9. The device according to claim 8, wherein a voltage occurring between the ends of the current path when the current flows into the second semiconductor element is less than a breakdown voltage of the first semiconductor element.

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10. The device according to claim 8, wherein:

the protection device further includes a trigger circuit which starts an operation of the second semiconductor element;

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the second semiconductor element is a thyristor or a bipolar transistor, the thyristor or the bipolar transistor having a control terminal connected to the trigger circuit; and

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the trigger circuit supplies the control terminal of the second semiconductor element with an instruction to start the operation of the second semiconductor element, when the current flows from the external connection terminal to increase a potential at the input/output terminal, and when the potential at the input/output terminal is less than a breakdown voltage 20 of the first semiconductor element.

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11. The device according to claim 8, wherein:

the second semiconductor element is a MOS transistor; and

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a gate potential of the MOS transistor changes in synchrony with a voltage at the one end of the current path.

12. The device according to claim 7, wherein an entire portion of the second well region in a depth direction has a lower impurity concentration than an entire portion of the first well region in the depth
5 direction.

13. A semiconductor device comprising:
an internal device including a first well region and a first semiconductor element formed in and/or on the first well; and
10 a protection device including a second well region and a second semiconductor element formed in and/or on the second well region, the second well region having a lower impurity concentration and having a greater depth than the first well region, the protection device protecting the first semiconductor element.
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14. The device according to claim 13, wherein:
the second semiconductor element includes a current path, the current path having one end connected to an external connection terminal and another end connected to a ground potential;
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the first semiconductor element having an input/output terminal connected to the external connection terminal; and

25 the second semiconductor element guides, to the ground potential via the current path, a current flowing to the second semiconductor element from the external connection terminal, to prevent the first

semiconductor element from being destroyed by the current.

15. The device according to claim 14, wherein a voltage occurring between the ends of the current path when the current flows into the second semiconductor element is less than a breakdown voltage of the first semiconductor element.

16. The device according to claim 14, wherein:
the protection device further includes a trigger circuit which starts an operation of the second semiconductor element;

the second semiconductor element is a thyristor or a bipolar transistor, the thyristor or the bipolar transistor having a control terminal connected to the trigger circuit; and

the trigger circuit supplies the control terminal of the second semiconductor element with an instruction to start the operation of the second semiconductor element, when the current flows from the external connection terminal to increase a potential at the input/output terminal, and when the potential at the input/output terminal is less than a breakdown voltage of the first semiconductor element.

17. The device according to claim 14, wherein:
the second semiconductor element is a MOS transistor; and
a gate potential of the MOS transistor

changes in synchrony with a voltage at the one end of the current path.

18. The device according to claim 13, wherein an entire portion of the second well region in a depth direction has a lower impurity concentration than an entire portion of the first well region in the depth direction.